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ABSTRACT

Results of a study of the equity of salaries of University of Alaska full-time, nonbargaining-unit employees are presented. The following questions were investigated: (1) whether salary differences exist between sexes and races, and (2) which individuals should be considered for salary equity committee review. After introducing salary equity studies in higher education and benchmark lawsuits, analytical approaches used in salary equity studies are explained. The first phase of the study is categorized into four steps: setting the data parameters, data verification testing, data validity testing, and data testing from preliminary regressions. The employees were aggregated into the seven equal employment opportunity (EEO) job categories, with some modifications. Specific attention is directed to the research methodology, including testing of scenarios, the flagging criterion, and the use of salary ranges for grouping employees by job requirement and skill. Statistical summaries of the results are presented for each of the seven EEO job categories. It was found that significant differences existed between sexes and races for all EEO categories, except for technical staff. Suggestions for future research are included. (SW)

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UNIVERSITY OF ALASKA

1983 SALARY EQUITY STUDY:

THE ANALYTICAL PROCESS

Prepared by:

Dr. Thomas A. Gaylord

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CHAPTER I

SALARY EQUITY STUDIES IN HIGHER EDUCATION

Introduction

Salary inequity lawsuits in higher education can be brought under any of the following pieces of employment discrimination legislation: 1) Civil Rights Act of 1866 and 1871; 2) Age Discrimination and Employment Act; 3) The Equal Pay Act of 1963; and 4) Title VII of the 1964 Civil Rights Act. Most lawsuits brought against academic institutions have been class actions brought under Title VII of the 1964 Civil Rights Act charging sex discrimination. This is primarily because Title VII does not explicitly require the plaintiffs to first prove that their work is substantially equal in skill, effort and responsibility to that of men. Salary discrimination claims can be brought before the Affirmative Action Office, the Equal Employment Opportunity Commission or through a lawsuit against a university. According to LaNoue (1982), three out of four plaintiffs have lost their cases alleging violations of either Title VII or the Equal Pay Act of 1963 primarily because the burden of proof rests on the plaintiff and the legal bases for such lawsuits are narrow (p. 29). Additionally, the largest group of employees at academic institutions, faculty, had been exempt from the Equal Pay Act until 1972 (Hengstler, Muffo, and Hengstler, 1982, p. 2). The impact of employment discrimination litigation on higher education has been, nevertheless, considerable. As Koch (1982) stated: "At least 25 percent of all U.S. colleges and universities have conducted salary equity studies on their campuses in recent years" (p. 2).

The preponderance of lawsuits brought under Title VII necessitates a review of the general process by which a salary equity suit is resolved in the courtroom. The following is summarized from the more exhaustive treatment given the topic by Nelson and Ward (1980, pp. 301-310).

As set forth by the U.S. Supreme Court, the framework within which proof should be analyzed in salary equity proceedings consists of the following three steps:

> ... plaintiffs carry the initial burden of establishing a prima facie case of discrimination. If the showing is successful, the burden of rebuttal flows to the defendant. Finally, the plaintiff is given the opportunity to present evidence that the defendant's profferred rebuttal is actually a pretext for unlawful discrimination. (p. 301)

Three primary methods of proof have evolved and have been successfully applied using the framework described. These are disparate treatment, disparate impact and a pattern or practice of discrimination. The difference between disparate treatment and disparate impact cases was defined by the Supreme Court in International Brotherhood of Teamsters v. United States:

> 'Disparate treatment' such as alleged in the present case is the most easily understood type of discrimination. The employer simply treats some people less favorably than others because of their race, color, religion, sex, or national origin. ...
>
> Claims of disparate treatment may be distinguished from claims that stress 'disparate impact.' The latter involves employment practices that are facially neutral in their treatment of different groups, but that in fact fall more harshly on one group than another and cannot be justified by business necessity. (431 U.S. 324, 339, 97 S.Ct. 1843, 1856, 52 L.Ed. 2d 396, 1977)

The pattern and practice of discrimination cases are prosecuted by the federal government under Section 707 of Title VII from the statute directly. Here the government must demonstrate that the application of an employer's employment practices or policies has resulted in a pattern or practice of discrimination unfairly affecting groups or individuals protected by Title VII.

In sum, a straightforward framework exists by which claims of salary inequity are processed. Additionally, higher education institutions are vulnerable from salary discrimination lawsuits brought under three primary theories of discrimination. Therefore, to adequately address the potential existence and magnitude of salary inequities requires an institution to carefully review the content and context of employment discrimination cases in higher education.

It is not intended that the cursory review of the literature reported in this paper function other than to brief the reader on the general historical aspects of salary equity studies as they relate to higher education. Exten-

sive compilations have already been assembled by Baldus and Cole (1975), Green (1982), Headley (1981), LaNoue (1982), Vanderwaerdt (1981) and Vogt and Robles (1980). The remainder of this chapter will include a summary of various legal precedents in the field of employment discrimination litigation that influenced the University's salary study, an explanation of the analytical approaches that have been employed to identify and rectify salary inequities, the statement of the research problem and the goals and objectives of the study.

Legal Precedents

The intent of this section is not to compile an annotated bibliography of every higher education salary equity lawsuit since 1972, or for that matter, every lawsuit reviewed for this study. Rather, it is intended to demonstrate how various court decisions have been incorporated into the construction of the University of Alaska salary equity models. Similarly, the legal decisions had an influence on the recommendations on how to implement the salary models.

The process of reviewing salary equity lawsuits was primarily structured around answering the following six questions:

1. What information is necessary to prove the prima facie case of discrimination?
2. How have the courts reacted to the increasing complexity of the statistical approaches available?
3. What statistical methodology has been received most favorably in the courtroom?
4. Are there any guidelines available for which variables are needed when analyzing salary across sexes and races?
5. Is there a recommended methodology for the application of any salary equity models?
6. What is the potential fiscal impact on a higher education system that loses a salary equity lawsuit?

In determining what is sufficient proof to constitute a successful prima facie case, the Supreme Court stated in McDonnell Douglas Corp. v. Green (411 U.S. 974, 1973) that no general rule can be defined since the statistics used and other elements of the lawsuit will vary from case to case. In Griggs v. Duke Power Co. (401 U.S. 424, 426, 432, 1971), even in the absence of an explanation of differing job-related abilities, the Supreme Court ruled that the simple demonstration of a percentage difference was sufficient to constitute a Title VII violation. In this situation, the prima facie case was made entirely on percentages. Subsequently, in both the International Brotherhood of Teamsters v. United States (supra) and the Hazelwood School District v. United States (433 U.S. 399, 97 S.Ct. 2736, 53 L.Ed. 2d 768 1977) cases, the Supreme Court ruled that statistics alone may be sufficient to establish a prima facie case of discrimination. In recent years the level of statistical sophistication has had an impact on what constitutes a successful prima facie case. In Keys v. Lenoir Rhyne College (522 F.2d 579 1977), the plaintiff provided evidence that showed the mean average male faculty salary was higher than that of female faculty. But the court ruled that no prima facie case was established since the plaintiff failed to analyze for differences in faculty rank and discipline or department. Therefore, the extent that the University of Alaska is vulnerable to a prima facie salary equity suit can be ascertained by statistical analysis alone.

The second question investigated was to determine what is an acceptable level of statistical complexity as determined by the court's reception. As reported by Hengstler, Muffo, and Hengstler, (1982, pp. 28-29), "the courts were, and to some extent still are, wary of having the expert witnesses of both sides attack each other's methodology in terminology beyond their comprehension. One federal district court judge has even gone on record to complain about Title VII class suits having become 'contests between college professor statisticians who revel in discoursing about advanced statistical theory'" (Otero v. Mesa County Valley Dist., 470 F. Supp. 326, 331, D. Colo., 1979). In the same case, the federal district court judge stated: "Judges are quite handicapped in trying to understand this (statistical) testimony... All a trial judge whose statistics course dates back 45 years can do is try to use his limited knowledge of this quasi-mathematical approach to a problem then temper the argued for results with a pinch of common sense." Courtroom proceedings

seem to indicate, therefore, that the use of extremely complex or unfamiliar statistical analyses is unwise.

What statistical methodology is, therefore, the most accepted and relied on approach in determining the existence and extent of salary inequities? The court said in Wilkins v. University of Houston (654 F.2d 388, 5th Cir. 1981) that if properly used, "multiple regression analysis is a relatively reliable and accurate method of gauging classwide discrimination". The court went further and stated that regression analysis "may be the best, if not the only, means of proving classwide discrimination". After reviewing court cases in salary equity studies in higher education, Koch (1982) stated that the difficulties in various other techniques used to try to determine the extent of salary inequity in higher education institutions has resulted in multiple regression becoming "the dominant single approach to empirical salary equity analysis" (p. 6). Hengstler, Muffo, and Hengstler (1982) stated that

> ... it would appear that the multiple regression technique is the most effective method for analyzing sex discrimination in faculty salaries. The courts are beginning to recognize the utility of this approach, although they harbor some concern over the difficulty in understanding such statistics. One can expect to find an increase in the number of regression studies being employed in sex discrimination cases. (p. 30)

To answer the third question then, the most widely acclaimed statistical approach in salary equity studies has been the multiple regression approach. It also appears to be the best received of the more highly sophisticated statistical approaches available. This was the approach used for the University's salary equity study.

Since multiple regression is the currently preferred statistical approach to prove or disprove a prima facie case of salary discrimination in higher education, the next critical question concerns what variables have been used in the procedure and tested in the courtroom in light of the fact that research has isolated up to 32 distinct variables that could affect the salary of faculty (see Greenfield, 1977, and McLaughlin, Smart, and Montgomery, 1978) Because most of the salary equity studies in higher education reported in the literature deal only with faculty, the discussion that follows is primarily directed toward a faculty analysis.

It has been demonstrated that the court will act against the inclusion of inappropriate independent variables in a multiple regression equation. These inappropriate variables would be those that are not directly related to salary or found to be generally inappropriate for the situation. An example would be the inclusion of a marital status variable to predict salary. In Stastney v. Southern Bell Telephone & Telegraph Co. (458 F. Supp. 314, W.D.N.C. 1978), the court ruled that the defendant's regression model incorporated variables, such as marital status, that were inappropriate for salary equity determination. The court stated "there is no evidence that an unmarried woman is less likely to be productive than a married man". A related problem would be the exclusion of variables that are necessary. In Wilkins v. University of Houston (supra), a primary reason why the court ruled against the plaintiff was because no market factor was included in the regression model:

> It appears uncontroverted that the most important factor is the college in which a professor teaches -- all the factors being equal, professors in colleges such as law and engineering are, because of market forces outside the university, paid significantly more than professors in colleges such as humanities and social sciences. Accordingly, plaintiffs' statistical evidence showing that men and women of the same age, rank, or length of service are paid differently does not demonstrate discrimination because the college factor has not been considered.

The same conclusion was drawn in Keys v. Lenoir Rhyne College (supra). Depending upon whether or not discrimination in promotion and tenure has been proven, the exclusion or inclusion of rank is also critical. The court rejected the defendant's regression analysis in Mecklenburg v. Montana Board of Regents of Higher Education (93 Empl. Prac. Dec S 11, 438, D. Mont., 1976) since the court had found discrimination against women in the promotion and tenure process and rank had been used in the regressions. In Presseisen v. Swarthmore College (442 F. Supp. 593, E.D. Pa, 1977 aff'd. 582 F.2d 1275, 3rd Cir. 1978), the court ruled that the plaintiff's claim of discrimination in promotions had not been sustained and objected to the plaintiff's regression procedure because it excluded rank. A similar decision was reached in Keys v. Lenoir Rhyne College (supra).

Another problem deals with appropriate aggregations of the sample population in salary equity studies. The use of smaller and smaller aggregations may result in sex or race not being significant predictors in a multiple regression model. Indeed, "if the number of males in the sample is fairly large, the true effect of sex and salary may be 'masked' by the restricted number of females in the sample" (Hengstler, Muffo, and Hengstler, 1982, pp. 26-28). In Trout v. Hidalgo (517 F. Supp. 873, 1981) this is precisely what the defendant did to try to demonstrate that no significant salary difference existed on the basis of sex. The court disagreed with the defendant's methodology and expressed support in aggregating samples as follows:

> The court does not agree with the view that an aggregation across job lines necessarily destroys the probative value of regressions. Indeed, ...the technique is superior to methods which entail a fragmentation into populations so small that statistical analysis loses much of its power to find any discrimination.

It appears, therefore, that the choice of variables in a multiple regression salary equity analysis proceed with caution in determining which variables are inappropriate, which variables are appropriate and which sample aggregation has the best opportunity to flag inequities.

The fifth question researched involved the question of discriminate application of a salary schedule such as would be created by the construction of a salary equity regression model. In the 1976 case of the Board of Regents of University of Nebraska v. Dawes (522 F.2d 380, 8th Cir. 1975, cert. denied 424 U.S. 914, 1976), the court held that if an academic institution established a formula for deriving a minimum salary schedule for one sex, it is a violation of the Equal Pay Act to refuse to pay faculty of the other sex the minimum required under that formula. The net result is:

> ...if a university uses the regression weights in a formula to increase the salaries of female faculty members whose actual salaries were lower than predicted, those same weights must be used for male faculty members whose actual salaries were lower than predicted. (Hengstler, Muffo, and Hengstler, 1982, p. 29)

The sixth and last question addressed concerns the potential impact of a salary equity lawsuit. Two recent cases demonstrate that the potential impact is quite large. First, the case of Rajendar v. University of Minnesota, (20 E.P.D. 30, 225, D. Minn 1979) where

> The University of Minnesota was rocked by a landmark 1980 consent decree that stipulated the appointment of a special court master to resolve past and future claims of sex discrimination at the university through 1989. The court master is empowered to make financial awards which, according to the plaintiff's lawyers, might total $60 million.
>
> The case provoked widespread comment and dramatizes the currency and financial impact of salary equity proceedings in which the decision goes against the institution involved. (Koch, 1982 p. 1)

The other example of potential impact involves the recently decided case of Melani v. Board of Higher Education of City of New York (73 Civ. 5434, D. NY 1983) where a multiple regression model had been used. As summarized in Public Personnel Administration - Policies and Practices from Personnel:

> Relying solely on statistical evidence gleaned from a computerized personnel data system, a federal district court in New York has ruled in favor of a class of female teachers and administrators who charged the City University of New York with sex-based pay discrimination over the past 15 years ... The parties were ordered to submit proposals for the calculation of the back pay to be awarded ... This sum is likely to run into the millions of dollars. CUNY has 17 senior and community colleges and a graduate department. The class, consisting of all CUNY's female teaching professionals and administrators and female applicants for those jobs since 1968, numbers in the thousands. (pp. 3-4, 1983)

Although it has been already mentioned that three out of four salary equity lawsuits in higher education fail, the potential impact of a successful lawsuit can be quite severe.

Analytical Approaches

Although new approaches are being researched (see, for example, Carter, Das, Garnello, and Charboneau, 1983), nearly all of the variations of courtroom tested salary equity methodologies fall into one of the following three categories:

1. Descriptive approach
2. Paired-comparison approach, or
3. Multiple regression analysis approach.

The following discussion concerning definitions of these analytical approaches was taken from a more thorough treatment of the topic by Hengstler, Muffo, and Hengstler (1982, pp. 9-30).

The first approach, the descriptive method, was used primarily in early discrimination cases for establishing the prima facie case of discrimination. The effectiveness of this method in establishing a prima facie case is centered on its ability to present frequencies and percentage differences as evidence of sex or race discrimination. A major problem of this method is that the percentages and frequencies used can often be refuted by simple demographic analyses such as breaking down the salaries by rank, highest degree, discipline, or different samples of cohorts.

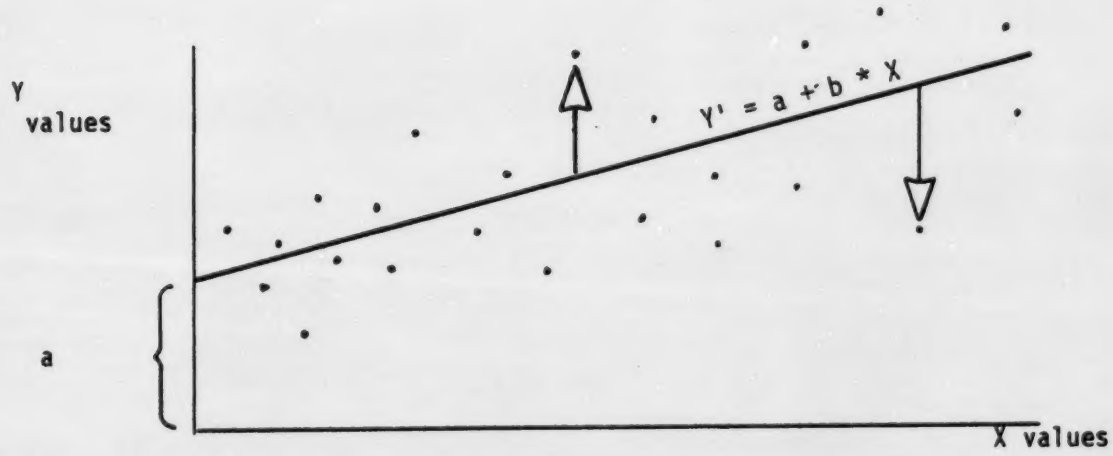
The second approach for determining possible sex discrimination is the paired-comparison or counterparting approach. The technique involves finding "a white male who is similar to the woman under study in attributes and experience and then claim that her salary should match that of the white male" (Scott 1977, p. 6). The accuracy of this technique depends completely on the validity of the pairs chosen for comparison. As Koch (1982) stated:

> Upon occasion it is possible to match faculty in terms of degree attainment, discipline, and experience, and in terms of performance variables such as published articles and books. But the very diversity of academic institutions as a whole, and of academic departments and faculty responsibilities in particular, typically means that nearly every matched pairing is imperfect in some way. The relevant question becomes a degree of variance in the pairing. (p. 5)

The advantage of the paired-comparison approach lies in its simplicity and straightforwardness. It can be easily understood by all, most importantly the courts.

The third approach is multiple regression. Multiple regression is a statistical technique that measures the relationships between a criterion, in this case salary, and a set of independent variables presumed to have a direct relationship with salary. A major advantage of this approach is that it determines not only whether a particular independent variable such as rank influences salary but also how much the independent variable influences salary. That is, it assigns a number, called a beta weight, approximating how much the value of a given independent variable should be weighted in the formula estimating the actual salary of an individual.

Figure 1.1
The Simple Linear Regression Case



In the case of simple linear regression where there is one independent variable and one criterion, what the regression does is plot the actual criterion (y) and independent variable scores (x) and then fit a straight line among the scores. The line is determined by the least squares solution, which means

that the sum of the squared deviations between actual and predicted squares is minimized, Figure 1.1. In calculating the line, one must determine the parameters of "a" and "b" (i.e., the intercept and the slope of the line). The intercept (a) is that point where the line intercepts the Y-axis. The slope of the line (b) determines the rate of increase or decrease in Y as the value of X increases by one unit. The slope of the line is thus the weight that is attached to X. The formula for the simple regression equation is expressed as follows:

$$Y' = a + b * X \qquad (1.1)$$

where

- Y' is the criterion or predicted score (salary),
- a is the intercept or constant,
- b is the regression weight attached to X (slope of the line), and
- X is independent variable (e.g., years of job-related experience).

The above principles hold true when more than one independent variable is involved. When more than one independent variable is used, the procedure is termed multiple regression analysis and the formula is identical to the above equation except that more independent variables are involved.

As an example, assume that an institution has conducted a multiple regression study using the salaries of faculty members as the dependent variable. The independent variables for this example study were: (a) whether the person has a terminal degree in their area (0 = no, 1 = yes); (b) years since degree was attained; (c) years of experience at the institution; (d) whether the person is in a given department (0 = no, 1 = yes); and (e) sex (0 = female, 1 = male). For this example, the institution attained the following regression equation:

$$\begin{aligned}\text{Predicted 12-month Salary} &= \$20{,}000 \\ &+ \$\ 2{,}000 * (\text{terminal degree}) \\ &+ \$\ \ 500 * (\text{years since degree earned}) \\ &+ \$\ 1{,}000 * (\text{years of experience}) \\ &+ \$\ 2{,}000 * (\text{department}) \\ &+ \$\ \ 900 * (\text{sex}) \qquad (1.2)\end{aligned}$$

An interpretation of the above equation would be that predicted salaries equal $20,000 plus $2,000 if the person has a terminal degree, plus $500 for each year since obtaining the degree, plus $1,000 for each year of experience at the institution, plus $2,000 if the person is a faculty member of a given department, plus $900 if the person is male. In other words, controlling all other variables in the equation, being female means $900 less salary, on the average, than the male counterpart with identical qualifications.

This information alone is not sufficient to interpret the results from a multiple regression analysis. One also needs to know what the standard error of regression weights (B values) are, the significance level of the regression weights, the standard error of estimate, and the multiple correlation and its square. To fully understand the regression model, one must be aware of the assumptions, limitations, and specific characteristics of the model. The two characteristics which most affect the results of a multiple regression study are the type of predictors or independent variables and the type of sample employed. A related problem is that of multicollinearity, which refers to the substantial correlation between some or all of the independent variables allowing for misinterpretations of the results. Multicollinearity serves to "mask" the true relationship between the independent and dependent variables. Another problem includes the possibility of regression to the mean which could inflate the size of the predicted salaries of individuals in the sample with 1) lower professional qualifications, such as merit, and 2) lower salaries than the group of white males. Other problems include the possibility that the relationship between the independent variables and salary may be nonlinear and that there may exist a difficulty in obtaining the desired data for the use in the regression equation. Nevertheless, the weaknesses inherent in the use of multiple regression do not necessarily preclude its

utilization in salary equity determinations, but they do indicate a need for something beyond a strict formula approach in resolving who is truly receiving an inequitable salary and what an equitable level would be. The interested reader is referred to Kerlinger and Pedhazur (1973) and Chatterjee and Price (1977) for more detail on the multiple regression procedure.

The Problem

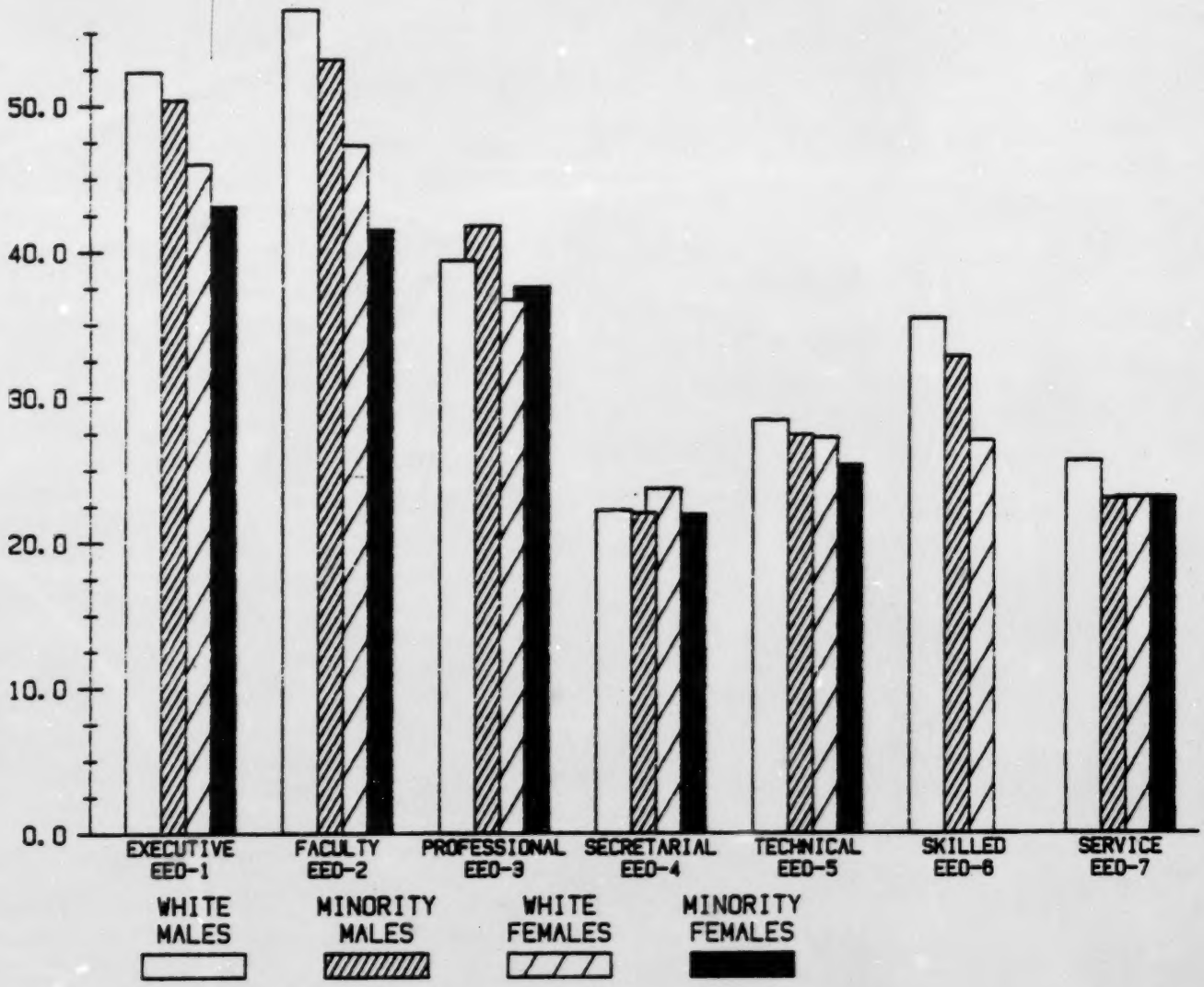
The comparison of equivalent 12-month, Anchorage based salaries for all University of Alaska full-time, nonbargaining unit, permanent employees grouped by the seven EEO job categories shows that in all but EEO Category 4, which is secretarial, the mean salary for males is greater than for females. Figure 1.2 shows the results of further breaking each EEO category into race and sex groups for the 2,403 employees that were included in the salary equity study. Group 1 consists of white males, Group 2 consists of minority males, Group 3 consists of white females, and Group 4 consists of minority females. This figure clearly demonstrates that, in terms of a descriptive statistical approach using highly aggregated employee groups, a strong justification for the analysis of salaries by sex and race exists for University of Alaska employees.

Goal/Objectives

The overall goal of the University of Alaska Salary Equity Study is to flag, as accurately as possible, those University employees who have a high probability of currently experiencing an inequitable salary level for review by committee. The primary objectives of this research project are to answer the following three questions:

FIGURE 1.2

A Comparison of 12-Month Anchorage Base Mean Salaries (x $1,000)
for Full-time, Permanent, Nonbargaining Unit Employees



1. Do statistically significant salary differences exist between sexes and races for each EEO category?

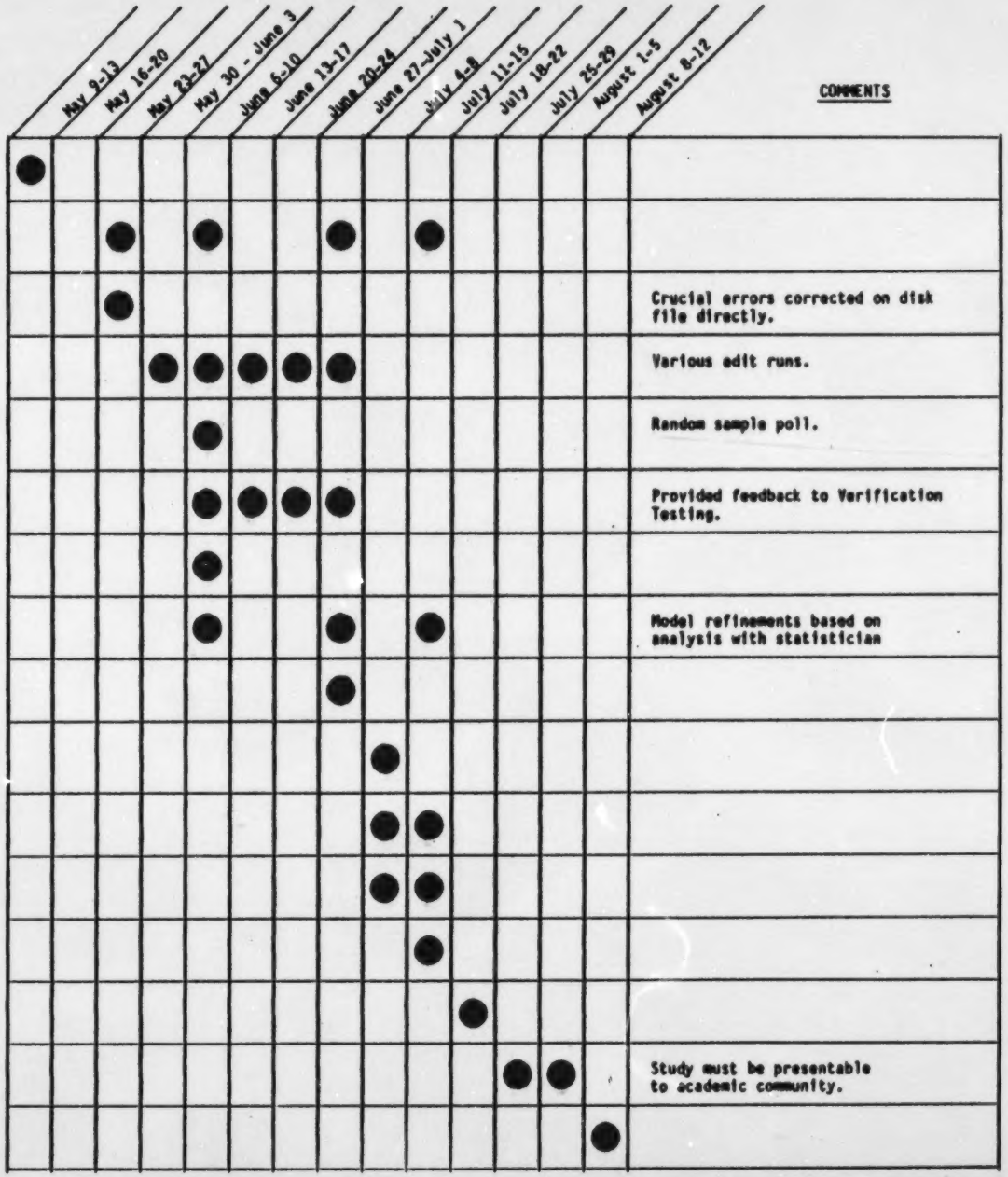
2. Could any of the statistically significant differences found be due partially to sex or race factors?

3. Which individuals should be considered for salary equity committee review?

Study Overview

The Salary Equity Study is comprised of four chapters. Chapter I is an introduction to salary equity studies in higher education with a review of various benchmark lawsuits as they relate to higher education, an explanation of the analytical approaches used in salary equity studies, a statement of the problem and the goals and objectives of the study. Chapter II describes the process of collecting and verifying the data used in the analytical procedure. Chapter III describes the analytical procedure in three phases that parallel the three primary objective questions previously described in the Goals/Objectives section of Chapter I. Finally, Chapter IV is a summary of the several caveats in the application of the study results and some suggestions for future research. A Gantt chart of the principal project activities is provided in Figure 1.3.

FIGURE 1.3
Project Activity Chart



ACTIVITY	OFFICES INVOLVED (RANKED)	COMMENTS
Project Eval./Recom.	SBO, AA, IS, PR, UNET	
Progress Meeting	AA, SBO, PR, OHRD	
Data File & Preliminary Program to SBO	IS	Crucial errors corrected on disk file directly.
Data Verification Testing	SBO, PR, AA	Various edit runs.
Data Validity Testing	PR	Random sample poll.
Testing from Preliminary Regressions using AAUP	SBO	Provided feedback to Verification Testing.
Literature Search	SBO	
Statistical Review	SBO, UA-Math	Model refinements based on analysis with statistician
Sign-off on Data	PR, AA, SBO	
ANOVA Test	SBO	
Total Sample Regression Model Development	SBO	
White Male/Female Regression Model Development	SBO	
Employee Listings & Fiscal Impact Analysis	SBO	
Present Results to President	SBO, AA, PR, OHRD	
Compile Report	SBO, AA	Study must be presentable to academic community.
Present Results to Chancellors	SBO, AA	

CHAPTER II

DATA

Introduction

The first phase of the Salary Equity Study involved the compilation of the data file that was needed for the study. The actual procedure can be categorized into four basic steps: 1) setting the data parameters, 2) data verification testing, 3) data validity testing, and 4) data testing from preliminary regressions. This Chapter delimits the details of each of these four steps.

Constructing the Salary Equity Study Data File

Setting the Parameters

During the summer of 1982, a committee composed of Human Resource and Affirmative Action administrators throughout the system, the President of the Statewide Assembly and representatives from the faculty and the offices of Information Services, Institutional Studies, Payroll, Computing Services, and Finance was appointed. The purpose of this committee was to develop a list of what data elements would be needed for a salary equity study and the process by which that data would be collected.

It was decided that only full-time, nonbargaining unit, permanent University of Alaska employees would be included in the study. For these employees, most of the data elements that the committee agreed on could be extracted from the University's Payroll Master File. For those data elements that were not included in the payroll file, two questionnaires were designed to obtain the information - one for faculty and one for nonfaculty. The questionnaires, which were primarily comprised of experience-related questions, were pilot tested on a small sample of University employees to resolve various procedural

problems after which all University employees were requested to complete the questionnaire that fall. Responses were compiled to create the Career Profile File. Once the Career Profile File was created, it was then merged with an extract from the Payroll Master File to create the 1983 Salary Equity Study Data File.

Data Verification Testing

The process of verifying the Salary Equity Study data required a combination of two editing procedures. The first editing procedure involved pre-file-merging error testing. That is to say that before the Payroll Master File and Career Profile File were combined to form the Salary Equity Study Data File, simple and straightforward data checking routines were applied to specific data fields of the Payroll Master File. Examples of the data checking routines would include flagging all records where race or sex data fields were blank. The other editing procedure involved post-file-merging data checking routines. In this case, after the Payroll Master File and Career Profile File had been merged to form the Salary Equity Data File, more sophisticated edits were performed using logic benchmarks between data elements.

The original process for correcting any confirmed data errors involved updating either the Payroll Master File or the Career Profile File and then completely recreating the Salary Equity Study Data File, which was a disk file. This process inherently had two principle flaws which were injected into the initial verification process. First, because the Payroll Master File and Career Profile File were "live" files, new errors were being added to the Salary Equity Study Data File each time these two files were re-merged. The process of trying to obtain a clean merged file subsequently became unacceptably time-consuming. The fact that this process had been going on for more than half a year gave rise to the second potential problem of antiquating various Career Profile File experience responses. Over the six month period that this initial phase of file editing occurred, new employees were also required to complete a Career Profile Questionnaire. A maximum discrepancy of half a year arose between the newest University of Alaska employees and the majority of employees that completed a Career Profile Questionnaire in the fall.

To help resolve these two problems, the Salary Equity Study Data File was frozen in May, 1983. All succeeding data verification tests were run against this data file. Additionally, all data corrections were made directly to this disk file. Once the data verification process produced a satisfactory file, a sensitivity analysis was performed which showed the pre-supposed problem of antiquated questionnaire responses to be not significant.

The two most significant outcomes of the error data verification process involved deriving an appropriate salary smoothing calculation and the resolution of various Hay Point difficulties. The first problem, that of determining a smoothed salary calculation, arose due to the fact that the employees of the University of Alaska have various contract periods and also have various cost of living, "geographic differential" factors applied to their salaries depending upon where their work location was in Alaska. One cannot develop a regression model to flag potential salary inequities if salaries of the individuals in the sample represent a mixture of 9, 10, 11, or 12-month contract periods, or have been multiplied by some factor greater than or equal to one to compensate for a difference in cost of living because of geographic location. To resolve the problem, the Anchorage based hourly salary rate of each employee was used. This hourly rate was then multiplied by a factor of 2,080, which is the standard number of working hours in a year used by the University, to produce a more easily understood 12-month smoothed salary.

The other problem dealt with Hay Points, primarily in EEO Category 1 (executive). "Hay Points" refers to a scale which rates the difficulty of most executive and professional positions at the University. The higher the Hay Point total for an employee position, the more difficult the responsibilities of the job. Since Hay Points were a critical independent variable for the regression models for both EEO Categories 1 and 3 (executive and professional, respectively), it was essential that any problems concerning them be resolved. Various edit runs showed that numerous data records had zero Hay Point totals, dummy Hay Point totals or incorrect Hay Point totals. It was decided that all faculty administrators in EEO Categories 1 and 3 who had zero Hay Points would be moved, for the purposes of this study, to EEO Category 2 which was originally comprised of only teaching, research and public service

faculty. In addition, a dummy variable was included in the EEO Category 2 regression models which would function as an indicator as to whether an individual was faculty or faculty-administrator. All records that had incorrect Hay Point totals were corrected. Lastly, all records where dummy Hay Point totals were recorded and no true Hay Point total had been ascertained, were deleted from the study.

Data Validity Testing

Another step was to check the validity of various data fields. The procedure primarily checked the consistency of the interpretation of the Career Profile Questionnaire questions. A method had to be devised to address the question, "Did a significant number of employees misinterpret the various experience questions?".

A random sample poll was taken to determine whether or not significant questionnaire response errors were in existence. A sampling size of 97 individuals was taken, of which a response rate of slightly over 77% was obtained. The results indicate that, for approximately 95% of the records in the study, all experience questions had been properly interpreted.

Data Testing from Preliminary Regressions

Preliminary multiple regression analyses on each EEO category contributed to the construction of the Salary Equity Study Data File in two primary ways. First, the regression analyses indicated what data elements were initially potential independent variables for the models. The potential model variables highlighted from the preliminary regression analyses functioned as feedback for the data verification process by assisting in delimiting further edits that concentrated on these variables. In sum, these regression results functioned to refine the verfication process.

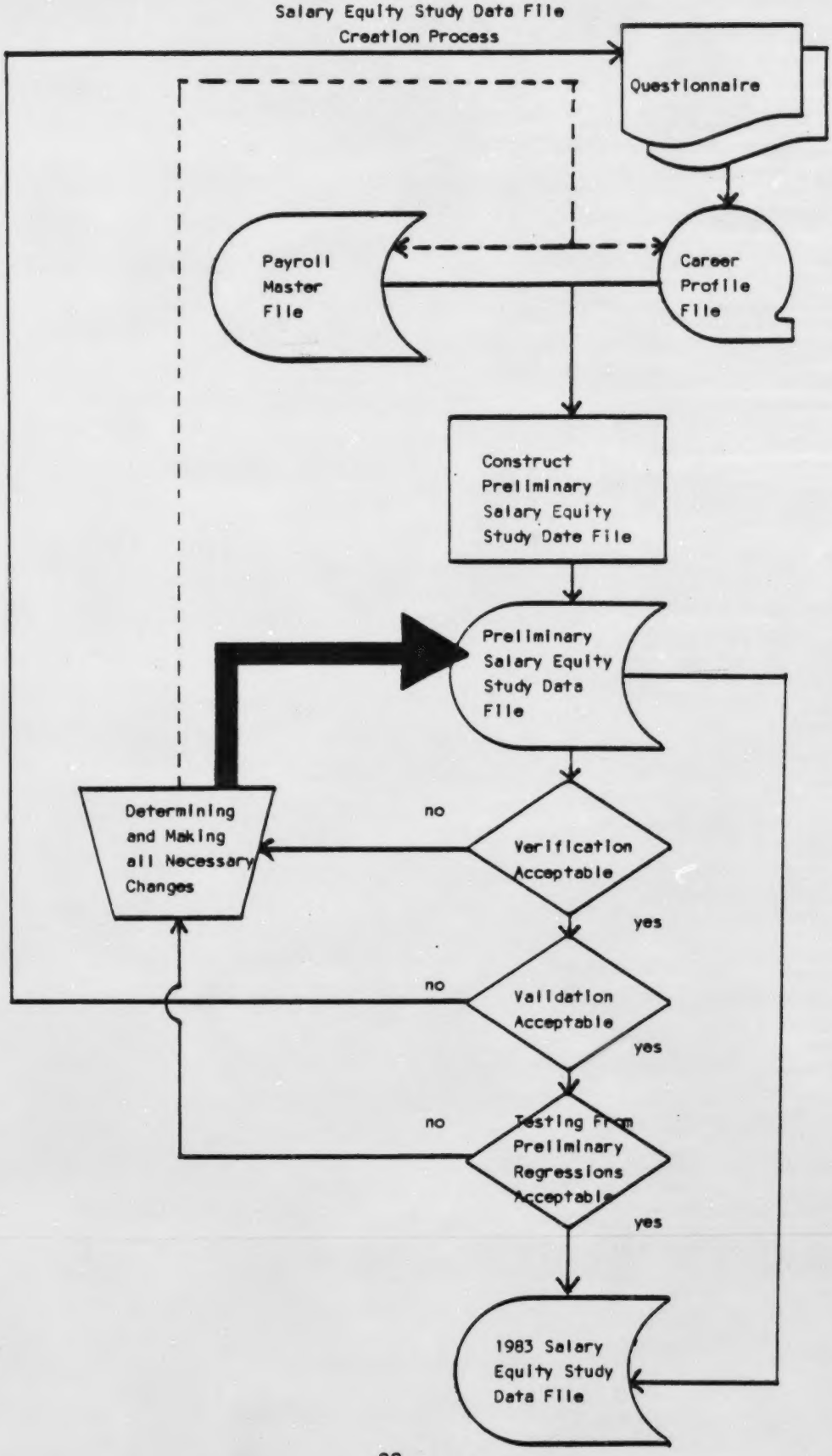
Secondly, regression results pinpointed individual records with predicted salaries that were more than two standard deviations away from their actual salaries. These cases were reviewed as possible "outlier" candidates. In this analysis, any predicted salary more than two standard deviations away from its actual salary was considered a potential statistical outlier and required investigation (see Neter and Wasserman, 1974, p. 107). Knowing which independent variables were used for predicting salary meant that the first step was to review the values of the independent variables for each outlier salary found for data accuracy. The next step was to ascertain whether or not that employee was truly in the proper EEO job category. In this fashion, several data problems were uncovered and subsequently corrected.

Summary

Although presented in a structured and sequential fashion, the process of constructing the Salary Equity Study Data File was not nearly as eloquent as the preceeding discussion would seem to indicate. A simplified version of the process is depicted in Figure 2.1. The condition of the primary data bases from which the Salary Equity Study File was created, coupled with the original error-correcting procedure, resulted in making the overall process a slow and difficult one. However, by July 1, 1983, a file was completed where both an acceptable degree of confidence in data accuracy had been shown for those independent variables that had a high probability of being the final predictors in the regression models and all program-related problems had been ironed out.

The difficulty involved in obtaining an acceptable file was partially due to the fact that this was the first time such a study was ever attempted at the University. As a result, a number of other benefits resulted from the difficulties encountered. First, the data editing procedure highlighted the need for an integrated "Human Resource Information System" at the University. With

FIGURE 2.1
Simplified Flow Chart of the
Salary Equity Study Data File
Creation Process



such a computer data base system and the necessary support tools, the problem in doing studies such as this will be lessened considerably. Secondly, the Career Profile Questionnaires, which will be applied periodically, have been improved in response to both procedural and interpretation difficulties. Lastly, several peripheral research questions were developed. For example, increased scrutiny of existing Hay Point assignments resulted. The task of assigning new Hay Point totals to missing records found in the executive and professional EEO categories has been undertaken. The validity of a number of employee positions originally placed in certain EEO job categories has also been questioned.

CHAPTER III

ANALYTICAL PROCEDURE

Introduction

Satisfactory resolution of all data problems identified was critical prior to the final development of regression models intended to flag University of Alaska employees for salary inequity review. As has already been mentioned, it was decided that for the purposes of this initial study, only full-time, permanent, nonbargaining unit University of Alaska employees would be included. These employees were aggregated into the seven EEO job categories, with the various modifications referred to in the previous chapter. Further, the aggregation by EEO category was systemwide. That is to say the analysis and model derivations were done using all University employees in each EEO category together after salaries had been smoothed to 12-month Anchorage base equivalent salaries. Under these general constraints, the analytical process which follows was designed to thoroughly address the three primary objectives of the study that were outlined in Chapter I. These are:

1. **Do statistically significant salary differences exist between sexes and races for each EEO category?**
2. **Could any of the statistically significant differences found be due partially to sex or race factors?**
3. **Which individuals should be considered for salary equity committee review?**

The Question of Statistically Significant Salary Differences

To address the question of whether or not the mean salaries depicted in Figure 1.2 are significantly different, a One-way Analysis of Variance (ANOVA) was run for each EEO job category. The results are displayed in Table 3.1. Statistically significant salary differences existed in every EEO category except for EEO Category 5, which is the technical employees category. Since there are four groups (white males, minority males, white females and minority females) that could conceivably have accounted for the significant salary differences, the next question to answer was where do the significant salary differences occur within EEO Categories 1, 2, 3, 4, 6, and 7.

TABLE 3.1
One-Way ANOVA Results

EEO CATEGORY	1 Executive		2 Faculty Faculty-Admin.		3 Professional		4 Secretarial		5 Technical		6 Skilled		7 Service	
GROUP	N	Mean Salary	N	Mean Salary	N	Mean Salary	N	Mean Salary	N	Mean Salary	N	Mean Salary	N	Mean Salary
White Males	75	52,300	461	55,100	163	39,400	58	22,200	128	28,400	92	35,400	85	25,600
Minority Males	15	50,400	42	53,200	11	41,800	16	22,000	10	27,400	8	32,800	45	23,000
White Females	42	46,000	144	47,300	100	36,700	525	23,700	131	27,200	4	27,000	29	23,100
Minority Females	2	43,100	8	41,500	15	37,600	138	21,900	14	26,300	0	0	42	23,100
F Ratio		3.906*		18.884*		3.749*		11.367*		1.787		4.159*		6.079*

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* Significant at 0.05 level.

Fisher's Least Significant Difference (LSD) test was used to ascertain where the significant salary differences found from the One-way ANOVA procedure existed. Table 3.2 shows where the significant salary differences occurred between the four race and sex groups within each EEO category. EEO Category 5 was not included because the One-way ANOVA procedure indicated no significant salary differences existed for that group. For completeness, the assumption of equal variances was checked using the Bartlett-Box F statistic (see Dixon and Masey, 1956, pp. 308-310).

The statistical procedures used to answer the question of whether or not statistically significant salary differences exist between sex and race groups and where those significant salary differences exist, resulted in finding significant differences in all but EEO Category 5. Additionally, Fisher's LSD test results seemed to indicate that salary differences between sex groups dominated the differences between race groups since seven pairs of statistically significant salary differences existed between males and females within the same racial group, compared to only two pairs when comparing different racial groups within the same sex group.

The Question of Attributing Significant Salary Differences to Sex and/or Race

The next phase of the analytical procedure was to determine whether or not any of the statistically significant salary differences between sex and race groups discovered in the previous section were partially due to sex and/or race factors. The general procedure for developing the regression models in this section, as well in the succeeding section, involved following a rigorous sequence of activities. As has already been mentioned, a number of decisions were made during the analysis of the Salary Equity Study File data concerning the selection and aggregation of the file data. To summarize, only full-time, permanent, nonbargaining unit employees were included. These employees, for the most part, were then aggregated by the seven EEO job categories. Faculty administrators with zero Hay Points in EEO Categories 1 (executive) and 3 (professional) were placed in EEO Category 2 (faculty) making it a "faculty, faculty-admin" group. A variable was also added to differentiate between

TABLE 3.2

Fisher's LSD Test Results
Showing Where Significant Salary Differences Occurred *

	Minority Males	White Females	Minority Females
White Males	EEO 7	EEO 1 EEO 2 EEO 3 EEO 4 EEO 6 EEO 7	EEO 2 EEO 7
Minority Males		EEO 2 EEO 3	EEO 2
White Females			EEO 4

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* Significant at 0.05 level.

faculty and faculty administrators for EEO Category 2. The overall objective was to reduce the overall employee file to smaller more homogeneous groupings, yet, be careful not to make these aggregations so small that the effects of any possible race or sex salary inequities would be lost.

Following the sample and aggregation selection process, the next step involved a determination of which independent variables or predictors would be used in the construction of the regression models for each sample aggregation. A number of variable-related questions had to be addressed. First, which independent variables are appropriate for inclusion in the analysis? This involved the determination of whether or not, for example, inclusion of a marital status variable or a citizenship variable was legitimate. Another aspect dealt with how many variables should be included in the regression analysis. All too often, the regression procedure results in a "fishing expedition" where the number of independent variables approaches the sample size itself and the power of the regression test decreases, possibly resulting in spuriously high correlations. Various court decisions, research from other academic institutions, and recommendations from the AAUP were all used in the final variable selection process prior to beginning model development.

A third area affecting the choice of independent variables was the problem of multicollinearity. Multicollinearity occurs when high intercorrelations exist between some of the independent variables which can result in numerous misinterpretations of the model results. It can be reduced in two primary fashions: 1) by collecting additional information, principally through conducting another questionnaire, or 2) by squeezing "more information" out of the data at hand by constructing various nonlinear and combinational variables while deleting independent variables from the model that are highly correlated with variables that load ahead in the regression formula. Multicollinearity was reduced in the models by constructing various nonlinear and combinatorial variables from the original file data and by judiciously using the correlation matrix of the variables included.

Incorporating each of the above considerations, the following independent variables were selected as likely predictors in the succeeding regression models. For EEO Categories 1 and 3 (executive and professional, respec-

tively), the following eight generalized variable areas were included: 1) Hay Points and various nonlinear alternatives, 2) age, 3) experience and various nonlinear and combinatorial alternatives, 4) sex, 5) race, 6) a sex-race interaction variable, 7) highest degree, and 8) highest degree date and nonlinear alternative. For EEO Category 2 (faculty and faculty-admin), the following variables were used: 1) rank, 2) department, 3) administrator or not, 4) experience and various nonlinear and combinatorial alternatives, 5) highest degree, 6) highest degree date and nonlinear alternative, 7) sex, 8) race, 9) a sex-race interaction variable, and 10) age. EEO Categories 4, 5, 6, and 7 (secretarial, technical, skilled, and service, respectively) model development included the following variables: 1) experience and various nonlinear and combinatorial alternatives, 2) age, 3) race, 4) sex, 5) a sex-race interaction variable, and 6) ranges. The majority of the variables were categorical in nature and were introduced into the models by means of dummy variables (see Draper and Smith, 1981 pp. 241-257).

The process of deriving the final multiple regression models for each EEO category involved reviewing: 1) the multiple correlation and its square, 2) the standard error of estimate, 3) the standard error of regression weights, 4) the significance level of the regression weights, and 5) the correlation matrix of the independent variables to reduce the problem of multicollinearity. Briefly summarizing, the multiple correlation or multiple R indicates the correlation between some optimally weighted combination of independent variables or predictors with the dependent variable, in our case 12-month Anchorage base salaries. When the multiple R is squared, it becomes a measure of the amount of variance of the dependent variable that the set of independent variables in the regression equation explain. In our analysis, R squared also indicates the amount of additional variance accounted for in a salary by a given independent variable. The standard error of estimate provides an indication of the accuracy of predicting a person's salary. The greater the standard error of estimate, the less accurate the predicted salary is. The standard error of regression weights, or of the "B values", provides a measure of the reliability of the B value. The larger the standard deviation of a B value is, therefore, the less accurate the B value is in estimating the true influence of a given independent variable. Lastly, the significance level of the regression weights indicates whether or not the weight is significantly

different from zero. Generally, the T statistic is used to determine the significance of the weight.

In sum, carefully considering sample size and aggregation, the composition of the set of independent variables to be included in the regression, being sensitive to the problem of multicollinearity, and analyzing various model statistics provided the basic framework within which each regression model was developed. The statistical analyses applied in this study to derive the multiple regression models were accomplished using the SPSS software package. The principle procedure used was NEW REGRESSION (see Hull and Nie, 1982, pp. 94-120). Specific details of the models that resulted follow.

To answer the question of whether or not the statistically significant salary differences found in the previous section (using the One-way Analysis of Variance test) are partially due to sex and/or race model factors, regression models were developed utilizing the entire sample in each EEO job category. The strategy involved constructing: 1) a sex dummy variable where the value of one was assigned if the individual was male and a value of zero was assigned if the individual was female, 2) a race dummy variable where the value of one was assigned if the individual was white and a value of zero was assigned if the individual was nonwhite, and 3) a sex-race interaction variable which was the product of the sex and race dummy variables. Of the set of independent variables constructed, if race or sex was a strong factor in explaining the statistically significant salary differences uncovered by the ANOVA test, then one of these three dummy variables would be expected to load in the multiple regression model. A summary of the results of the secific models for each EEO category that follow is displayed in Table 3.3.

TABLE 3.3
Where Sex and/or Race Factors Partially
Accounted for Significant Salary Differences

EEO CATEGORY	1 Executive	2 Faculty, Faculty-Admin.	3 Professional	4 Secretarial	5 Technical	6 Skilled	7 Service
	Yes	Yes	Yes	Inconclusive	N/A	Inconclusive	Inconclusive

For EEO Category 1 (executive), Table 3.4 summarizes the final multiple regression results. Four variables loaded. The first, Hay Point Total, accounted for 68% of the variance. With the addition of a "Total University of Alaska Experience Years" variable, a sex variable, and a "Highest Degree Bachelors" variable, the total variance accounted for was 80%. The executive equation therefore has job content, experience, education, and sex dimensions. The B value of $1,924.9 for the sex dummy variable means, males receive $1,924.9 more salary, on the average, than female counterparts with identical qualifications, if all independent variables in the model were truly independent. Since sex loaded third, it can be concluded that the statistically significant salary difference between white males and white females found using Fisher's LSD test may be partially due to sex.

TABLE 3.4

Total Sample Regression Model
For EEO-1 - Executive

Multiple R	0.90
R Squared	0.80
Standard Error of Estimate	4,627

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Hay Point Total	34.8	2.0	0.000	0.68
Total UA Experience Years	711.7	80.1	0.000	0.79
Sex (1 = male, 0 = female)	1,924.9	924.7	0.039	0.80
Highest Degree Bachelors (1 = yes, 0 = no)	-1,596.6	890.0	0.075	0.80
(Constant)	19,445.0	1,504.6	0.000	

The total sample regression model for EEO Category 2 (faculty, faculty-admin.) had thirteen variables load. Table 3.5 summarizes the model characteristics. The last variable to load was the sex-race interaction dummy variable. The amount of additional variance accounted for by the inclusion of this variable, less than 1%, is minimal. Therefore, the effect of sex and race, in explaining the significant salary differences that were found between white males and white females, white males and minority females, minority males and white females, and minority males and minority females cannot be considered great. It can be concluded that the statistically significant salary differences between white males and white females, and white males and minority females found using Fisher's LSD test may be partially due to sex and race.

TABLE 3.5
Total Sample Regression Model
For EEO-2 - Faculty, Faculty - Admin.

Multiple R	0.94
R Squared	0.89
Standard Error of Estimate	4,006

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Professor (1 = yes, 0 = no)	25,244.0	761.2	0.000	0.58
Associate Professor (1 = yes, 0 = no)	15,212.5	644.8	0.000	0.79
Years in Current Rank/Position at UA	711.4	46.7	0.000	0.84
Administrator (1 = yes, 0 = no)	5,244.3	656.2	0.000	0.86
Years of Related Experience at UA	505.5	100.4	0.000	0.88
Total Other non-UA Experience Years	65.8	24.9	0.000	0.88
Assistant Professor (1 = yes, 0 = no)	5,664.9	600.5	0.000	0.89
Teaching Disc. is Business (1 = yes, 0 = no)	1,822.8	552.7	0.000	0.89
Year of Degree Squared	-0.9	0.2	0.000	0.89
Highest Degree Doctorate (1 = yes, 0 = no)	1,171.8	379.8	0.002	0.89
Teaching Disc. is SMI (1 = yes, 0 = no)	2,608.9	1,061.3	0.014	0.89
Teaching Disc. is Voc-Tec (1 = yes, 0 = no)	3,988.5	1,672.1	0.017	0.89
Sex/Race Interaction (1 = white male, 0 = else)	811.0	357.4	0.024	0.89
(Constant)	38,839.5	1,375.8	0.000	

For EEO Category 3 (professional), the total sample regression model had six variables load and had an R squared of 0.79. The race variable loaded fifth and accounted for an increase of less than 1% in the amount of variance explained. Table 3.6 summarizes the characteristics of the regression model. From it, it can be seen that the B value for the race dummy variable is a negative $1,725, which was an unexpected result. It means, if all independent variables were truly independent, being white means $1,725 less salary, on the average, than minority counterparts with identical qualifications. In regards to the ANOVA results in the previous section, the statistically significant salary difference between white males and white females found using Fisher's LSD test is accounted by other than sex or race factors. The significant salary difference between white females and minority males, however, may be partially due to race.

TABLE 3.6

Total Sample Regression Model
For EEO-3 - Professional

Multiple R	0.89
R Squared	0.79
Standard Error of Estimate	3,397

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	689.9	39.6	0.000	0.57
Highest Degree None (1 = yes, 0 = no)	-2,919.9	533.8	0.000	0.75
Related non-UA Experience Years	141.2	29.8	0.000	0.76
Hay Point Total	38.5	1.6	0.000	0.78
Race (1 = white, 0 = else)	-1,725.0	700.1	0.014	0.79
Highest Degree Bachelors (1 = yes, 0 = no)	-998.8	477.2	0.037	0.79
(Constant)	18,254.8	1,004.9	0.000	

The total sample regression model for EEO Category 4, secretarial, is summarized in Table 3.7. Nine variables loaded, accounting for 80% of the variance. None of the race or sex dummy variables loaded; therefore, the statistically significant salary differences between white males and white females, and between white females and minority females, can be accounted for by total University of Alaska experience years and the employee salary ranges.

TABLE 3.7

Total Sample Regression Model
For EEO-4 - Secretarial

Multiple R	0.94
R Squared	0.88
Standard Error of Estimate	1,287

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	537.3	15.4	0.000	0.59
In Range 75 (1 = yes, 0 = no)	10,777.3	667.4	0.000	0.67
In Range 74 (1 = yes, 0 = no)	7,692.9	649.1	0.000	0.76
In Range 77 (1 = yes, 0 = no)	16,079.7	939.7	0.000	0.80
In Range 78 (1 = yes, 0 = no)	16,492.9	1,124.9	0.000	0.82
In Range 73 (1 = yes, 0 = no)	5,648.9	648.8	0.000	0.85
In Range 76 (1 = yes, 0 = no)	13,226.3	1,115.8	0.000	0.87
In Range 72 (1 = yes, 0 = no)	4,090.6	654.6	0.000	0.88
In Range 71 (1 = yes, 0 = no)	2,341.3	707.8	0.001	0.88
(Constant)	14,767.2	643.6	0.000	

Table 3.8 summarizes the total sample regression model for EEO Category 5, technical. Although the One-Way ANOVA test showed that there did not exist any statistically significant salary differences, a regression model was run for this group. Ten variables loaded, accounting for 91% of the variance. The sex dummy variable loaded ninth, adding less than 1% of the variance accounted for to the model. From the table can be seen that the B value for the sex dummy variable is a negative $494.5. Although the contribution is weak, this indicates that individuals would have $494.5 taken away from their predicted salaries if they were males, if all independent variables were truly independent, compared to female counterparts with identical qualifications.

TABLE 3.8

Total Sample Regression Model
For EEO-5 - Technical

Multiple R	0.96
R Squared	0.91
Standard Error of Estimate	1,652

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	517.5	23.6	0.000	0.55
In Range 77 (1 = yes, 0 = no)	17,253.7	1,719.4	0.000	0.65
In Range 76 (1 = yes, 0 = no)	13,278.6	1,688.6	0.000	0.73
In Range 75 (1 = yes, 0 = no)	10,873.6	1,673.4	0.000	0.80
In Range 78 (1 = yes, 0 = no)	18,455.4	1,845.6	0.000	0.86
In Range 74 (1 = yes, 0 = no)	7,750.2	1,665.9	0.000	0.90
Related non-UA Experience Years	61.1	17.5	0.001	0.91
In Range 73 (1 = yes, 0 = no)	5,272.0	1,692.7	0.002	0.91
Sex (1 = male, 0 = female)	-494.5	209.1	0.019	0.91
In Range 72 (1 = yes, 0 = no)	3,620.7	1,709.7	0.035	0.91
(Constant)	15,186.5	1,652.5	0.000	

The total sample regression model for EEO Category 6, technical, is summarized in Table 3.9. Six variables loaded, accounting for 89% of the variance. None of the sex or race dummy variables loaded, indicating that the statistically significant salary difference between white males and white females found when applying Fisher's LSD test can be explained by total University of Alaska experience years and employee salary ranges.

TABLE 3.9

Total Sample Regression Model
For EEO-6 - Skilled

Multiple R	0.95
R Squared	0.89
Standard Error of Estimate	2,081

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	613.7	36.8	0.000	0.55
In Range 78 (1 = yes, 0 = no)	20,229.5	2,153.7	0.000	0.69
In Range 77 (1 = yes, 0 = no)	15,686.2	2,106.5	0.000	0.82
In Range 76 (1 = yes, 0 = no)	12,364.6	2,127.4	0.000	0.87
In Range 75 (1 = yes, 0 = no)	9,850.8	2,207.3	0.000	0.89
In Range 74 (1 = yes, 0 = no)	5,948.9	2,279.9	0.011	0.89
(Constant)	16,135.1	2,085.1	0.000	

Table 3.10 summarizes the total sample regression model for EEO Category 7, service. Nine variables loaded, accounting for 93% of the variance. Again, none of the sex or race dummy variables loaded, indicating that the statistically significant salary differences between white males and minority males, between white males and white females, and between white males and minority females found when applying Fisher's LSD test can be explained by total University of Alaska experience years, salary ranges, and related non-UA experience years squared.

TABLE 3.10

Total Sample Regression Model
For EEO-7 - Service

Multiple R	0.97
R Squared	0.93
Standard Error of Estimate	1,125

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	566.8	25.1	0.000	0.41
In Range 76 (1 = yes, 0 = no)	17,444.8	608.1	0.000	0.54
In Range 77 (1 = yes, 0 = no)	19,369.7	686.9	0.000	0.67
In Range 75 (1 = yes, 0 = no)	14,661.2	577.1	0.000	0.76
In Range 74 (1 = yes, 0 = no)	11,522.3	536.1	0.000	0.80
In Range 73 (1 = yes, 0 = no)	9,823.2	515.6	0.000	0.86
In Range 72 (1 = yes, 0 = no)	8,256.7	627.9	0.000	0.89
In Range 71 (1 = yes, 0 = no)	13,198.4	1,233.9	0.000	0.93
Related non-UA Experience Years Squared	1.2	0.6	0.038	0.93
(Constant)	10,914.1	506.5	0.000	

In sum, of the six EEO categories which were found to have statistically significant salary differences to exist between sexes and races, three of these EEO categories had salary differences that could be partially explained utilizing a sex, race, or sex-race interaction dummy variable. For EEO Category 1 (executive), the sex dummy variable loaded with a positive B value of $1,924.9, indicating that this amount would be added to a predicted salary provided the individual was male. For EEO Category 2 (faculty, faculty-admin), the sex-race interaction dummy variable loaded with a positive B value of $811, indicating that this amount would be added to a predicted salary provided the individual was a white male. Lastly for EEO Category 3 (professional), the race dummy variable loaded with a negative B value of $1,725, indicating that this amount would be subtracted from a predicted salary if the individual was white.

The Question of Flagging Individuals for Salary Review

The previous two research questions dealt primarily with ascertaining the extent of a class action problem with salaries due to race or sex factors. In a sense, the analytical procedure to this point has been directed toward determining and then parameterizing the problem of sex and/or race group salary differences that was presented in Chapter I. The next problem to resolve was to develop models for each EEO category that predicted equitable salaries. The difference between an employee's actual salary and predicted salary would be used to determine which individuals would be reviewed by a Salary Equity Committee. This Committee would, of course, have information that could not be quantified and included in the statistical models to further evaluate whether or not inequities exist and if they do, to make appropriate salary adjustment recommendations based on all the information at their disposal.

The following seven regression models developed to answer this final research question followed the same general development format outlined in the preceeding section with the exception of two important aspects. First, the models in this section would be developed using only employee subgroups in each EEO category. For EEO Categories 1, 2, 3, 5, 6, and 7, this meant that

the regression models were developed using the majority or "unprotected" group, which was white males. For EEO Category 4, the regression was developed using the majority group, which was white females. The second way in which the models developed in this section differed from those in the previous section was the fact that no sex, race, or sex-race interaction dummy variables were included.

The white male regression model summary statistics for EEO Category 1 (executive) are presented in Table 3.11. Three variables loaded, accounting for 83% of the variance. The variables, Hay Point Total, Total University of Alaska Experience Years, and Highest Degree Doctorate incorporate job content, experience and level of education dimensions.

TABLE 3.11
White Male Regression Model
For EEO-1 - Executive

Multiple R	0.91
R Squared	0.83
Standard Error of Estimate	4,364

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Hay Point Total	33.8	2.4	0.000	0.70
Total UA Experience Years	946.6	124.4	0.000	0.82
Highest Degree Doctorate (1 = yes, 0 = no)	2,157.2	1,294.6	0.100	0.83
(Constant)	19.896.6	1,848.5	0.000	

The white male regression model summary statistics for EEO Category 2 (faculty, faculty-admin) are presented in Table 3.12. Ten variables loaded, accounting for 88% of the variance. The variables comprise rank, experience, primary duty, educational level, degree date, and teaching discipline dimensions. As has already been mentioned, most higher education salary equity studies reported in the literature deal exclusively with faculty. A comparison of the results of the regression model developed for the University of Alaska faculty can be easily made. In a frequently cited salary equity study, Hunter (1978, p. 5) described the results of the University of Idaho's salary equity project for faculty. In it, the following five variable dimensions were incorporated into the model: 1) rank, 2) experience, 3) highest degree, 4) whether or not the faculty member was in an administrative position, and 5) the academic department. The result was that the model accounted for 85% of the variance.

A University of Illinois salary equity study on faculty salaries produced a multiple regression model that included experience, educational level, and various merit dimensions to account for 79% of the variance. Additionally, the standard error of the estimate was $3,861 (Braskamp, Langston, and Muffo, 1978, pp. 1-6). This compares with a standard error of estimate of $4,137 for the 1983 University of Alaska study.

The 1979 Utah State University study, although failing to incorporate productivity and supply/demand factors, included variables such as highest degree, department, rank, years of experience at Utah State, sex, race, age, teaching assignment, tenure status, and year current rank was awarded to obtain a faculty salary regression model that had an R squared of 0.81 (Gappa, Hurst, and Swenson, 1979, p. 16).

By no means was a meta-analysis conducted for determining the multiple regression variables used for faculty salary analysis and then ascertaining an expected R squared from the literature. A cursory review of the more recent regression models developed for faculty did indicate that the University of Alaska faculty regression model compares favorably to results obtained by other institutions.

TABLE 3.12
White Male Regression Model
For EEO-2 - Faculty, Faculty - Admin.

Multiple R	0.94
R Squared	0.88
Standard Error of Estimate	4,137

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Professor (1 = yes, 0 = no)	23,999.1	1,006.4	0.000	0.60
Associate Professor (1 = yes, 0 = no)	14,386.8	885.4	0.000	0.77
UA Years in Present Rank/Position	659.5	53.8	0.000	0.83
Administrator (1 = yes, 0 = no)	5,629.5	780.5	0.000	0.85
Years Highest Degree Earned Squared	-1.8	0.3	0.000	.086
Teaching Disc. Business (1 = yes, 0 = no)	2,483.6	631.6	0.000	0.87
Related UA Experience Years	451.9	115.0	0.000	0.88
Assistant Professor (1 = yes, 0 = no)	5,316.8	858.8	0.000	0.88
Highest Degree Doctorate (1 = yes, 0 = no)	1,208.1	479.9	0.012	0.88
Teaching Disc. is SMI (1 = yes, 0 = no)	2,364.1	1,333.1	0.055	0.88
(Constant)	45,143.5	1,722.9	0.000	

The white male regression model for EEO Category 3 (professional) is summarized in Table 3.13. Four variables loaded, accounting for 79% of the variance. The variables incorporate job content, University of Alaska experience, non-University of Alaska experience, and education dimensions.

The white female regression model developed for EEO Category 4 (secretarial) is summarized in Table 3.14. As was previously mentioned, the control group from which the regression model was developed for this category was white females, as compared to white males for all the other job categories. White females were used for two primary reasons. First, for EEO Category 4, the mean salary for white females is higher than for any of the other three sex/race groupings. Second, and more importantly, the number of white males in this EEO category is very small. Nine variables loaded, accounting for 87% of the variance. The job-related dimensions incorporated were University of Alaska experience and job content, as reflected in employee ranges.

TABLE 3.13

White Male Regression Model
For EEO-3 - Professional

Multiple R	0.89
R Squared	0.79
Standard Error of Estimate	3,416

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Hay Point Total	37.0	2.0	0.000	0.54
Total UA Experience Years	650.3	48.6	0.000	0.77
Related Other Experience Years	107.6	37.4	0.005	0.78
Highest Degree None (1 = yes, 0 = no)	-1,690.0	623.0	0.007	0.79
(Constant)	16,826.8	1,028.7	0.000	

TABLE 3.14
White Female Regression Model
For EEO-4 - Secretarial

Multiple R	0.93
R Squared	0.87
Standard Error of Estimate	1,377

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	539.2	18.4	0.000	0.57
In Range 75 (1 = yes, 0 = no)	10,686.3	821.6	0.000	0.65
In Range 74 (1 = yes, 0 = no)	7,804.1	801.8	0.000	0.73
In Range 77 (1 = yes, 0 = no)	17,588.1	1,146.1	0.000	0.78
In Range 78 (1 = yes, 0 = no)	16,523.6	1,269.4	0.000	0.82
In Range 73 (1 = yes, 0 = no)	5,710.2	802.1	0.000	0.84
In Range 76 (1 = yes, 0 = no)	13,269.0	1,258.3	0.000	0.86
In Range 72 (1 = yes, 0 = no)	4,216.6	812.5	0.000	0.87
In Range 71 (1 = yes, 0 = no)	2,272.2	917.7	0.014	0.87
(Constant)	14,714.9	795.3	0.000	

Table 3.15 summarizes the model statistics for the white male regression for EEO Category 5 (technical). Eight variables loaded, accounting for 95% of the variance. Present position experience and other position experience at the University of Alaska, as well as job content as reflected in analysis ranges, were accommodated job-related dimensions.

TABLE 3.15
White Male Regression Mode;
For EEO-5 - Technical

Multiple R	0.98
R Squared	0.95
Standard Error of Estimate	1,381

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Present Position Years at UA	687.6	35.6	0.000	0.62
In Range 77 (1 = yes, 0 = no)	13,548.2	707.4	0.000	0.71
In Range 76 (1 = yes, 0 = no)	9,424.1	632.3	0.000	0.77
In Range 78 (1 = yes, 0 = no)	15,218.9	1,001.7	0.000	0.85
In Range 75 (1 = yes, 0 = no)	7,357.4	618.5	0.000	0.93
In Range 74 (1 = yes, 0 = no)	3,793.2	616.6	0.000	0.94
Related Other Experience Years at UA	163.2	39.2	0.000	0.95
In Range 73 (1 = yes, 0 = no)	1,685.2	690.4	0.016	0.95
(Constant)	18,733.6	565.3	0.000	

The white male regression model for EEO Category 6 (skilled) is summarized in Table 3.16. Five variables loaded, accounting for 88% of the variance. Total University of Alaska experience and job content, as reflected by employee ranges, were accommodated by the model.

TABLE 3.16

White Male Regression Model
For EEO-6 - Skilled

Multiple R	0.94
R Squared	0.88
Standard Error of Estimate	2,124

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	616.4	38.0	0.000	0.57
In Range 78 (1 = yes, 0 = no)	10,236.1	951.8	0.000	0.71
In Range 77 (1 = yes, 0 = no)	5,753.4	824.1	0.000	0.83
In Range 71 (1 = yes, 0 = no)	-9,850.9	2,253.2	0.000	0.87
In Range 76 (1 = yes, 0 = no)	2,180.1	900.9	0.018	0.88
(Constant)	25,976.7	762.3	0.000	

The white male regression model for EEO Category 7 (service) is summarized in Table 3.17. Seven variables loaded, accounting for 92% of the variance. Total University of Alaska experience, related other non-University of Alaska experiences, and job content, as reflected by employee ranges, were factors accommodated by the model.

TABLE 3.17
White Male Regression Model
For EEO-7 - Service

Multiple R	0.96
R Squared	0.92
Standard Error of Estimate	1,339

Variable	B Value	Standard Error of B Value	T-Test Significant Level of the B Value	R Squared
Total UA Experience Years	557.1	39.7	0.000	0.49
In Range 73 (1 = yes, 0 = no)	-4,963.0	445.0	0.000	0.66
In Range 74 (1 = yes, 0 = no)	-3,156.9	452.8	0.000	0.77
In Range 72 (1 = yes, 0 = no)	-6,050.6	869.5	0000	0.86
In Range 77 (1 = yes, 0 = no)	4,666.1	700.1	0.000	0.89
Related Other non-UA Experience Years Squared	4.1	1.2	0.001	0.91
In Range 76 (1 = yes, 0 = no)	2,088.7	622.8	0.001	0.92
(Constant)	25,479.3	423.0	0.000	

The careful derivation of six white male regression models and one white female regression model produced satisfactory results concerning the absolute number and content of the predictor variables that loaded. Regression statistics for each of the seven models were acceptable for the approach agreed on for this initial study. These models were then used to ascertain predicted 12 month Anchorage base salaries for every employee in each EEO category contained in the Salary Equity Study Data file. Based on these results, a flagging policy could be developed.

Summary

The analytical procedure of the Salary Equity Study was designed to answer three primary objective questions. The first dealt with ascertaining whether or not statistically significant salary differences existed between sex and race groups within each EEO job category. The next question dealt with ascertaining whether or not the statistically significant salary differences found could be partially due to sex and/or race factors. The last question required the development of multiple regression models derived using an "unprotected" sex/race group in each EEO category and then applying all employees to the appropriate regression model for the purpose of identifying or flagging individuals potentially having inequitable salaries. The tables in Appendix B summarize the statistical characteristics of each of the EEO categories used in the study.

Once the multiple regression models developed for white females in EEO Category 4 (secretarial) and for white males for all other EEO categories yielded satisfactory results, they were used to predict employee salaries which were then compared to their "actual" 12-month Anchorage base salaries. The difference between the actual and predicted salaries is defined as the salary residual. An employee with a positive salary residual has an actual salary above the model-determined predicted salary. Negative residuals exist in the cases where actual salaries are below predicted salaries. The negative residuals, therefore, functioned to identify individuals for salary inequity review while the residual magnitudes served to scale the degree of any potential problem.

Additionally, the problem of estimating both the fiscal impact and the salary review committee workload was a function of the flagging criterion chosen. Muffo, Langston, and Braskamp (1978) summarized the problem in the following manner:

> ...using the traditional cutoff points, such as two standard deviations yield few, if any, faculty members as being victims of discrimination. Much lower confidence levels yield more victims of discrimination, but these are less acceptable statistically. A distinction must be made between policy significance and statistical significance. The former is most useful in this type of study (p. 4).

The estimation of the likely workload, therefore, is a function of not only the degree of inequity that exists but also of the flagging policy agreed on. A number of alternative impact statements were consequently developed for discussion and executive review utilizing the "multiple scenario analysis" procedure of Linneman and Klein (1979) and Nair and Sarin (1979).

The construction of the scenarios used to derive alternative workload statements were designed around the following three policy-related questions:

1. What salary residual cutoff should be used for the inequity flagging criterion? That is to say, should all employees that have actual salaries one standard deviation below, $1,000 below, 10% below, or 20% below their multiple regression model predicted salaries, be selected for salary inequity committee review?
2. Which individuals should be included in the flagging process? Should only employees in each EEO job category that were found to have statistically significant salary differences, when compared to others within that EEO category, be eligible for flagging or should the flagging criterion be applied to all individuals in all EEO categories?
3. How many employees in the resultant sample, using some cutoff flagging criterion, would be expected to get adjustments and how might the adjustments that were finally decided upon by the salary equity committee correlate with the salary adjustments predicted from the regression models?

The salient point to remember is that many scenarios were tested and many more exist. For example, scenarios that looked just at those EEO categories that had statistically significant salary differences explained partially by sex or race factors could be constructed where only the protected groups within each of those EEO categories would be analyzed. Another example might be to develop a more lenient flagging criterion and resolve to analyze only potential salary inequities at

specific campuses/BRUs. The particular scenario recommended, where all flagged university employees in every EEO category were included for review, was based on three primary concerns:

1) In view of the 1976 salary discrimination case of the Board of Regents of University of Nebraska v. Dawes (supra) where the court held that if an academic institution established a formula for deriving a minimum salary schedule for one sex, it is a violation of the Equal Pay Act to refuse to pay faculty of the other sex the minimum required under that formula, it was decided that all employees that met the flagging criterion regardless of sex or race would be used for estimating the likely workload.

2) The next concern involved the desire to minimize what in statistics is called a Type II error. In our case, the Type II errors would involve failing to flag a particular employee for possible salary inequity who should have been so identified. To reduce the probability of committing a Type II error for the total employees sampled in the salary equity study, it was recommended that the flagging criterion be a percentage and not a flat dollar amount or some function of the standard error of estimate of the model. Additionally, the flagging criterion should be applied to employees in every EEO category and not just those EEO categories that had significant salary differences between race and sex groups due to sex and/or race factors.

3) The final concern involved setting the actual magnitude of the percentage used as the flagging criterion. The concern was that too high a percentage amount would induce Type II errors while too low a percentage would produce an undesirable and unproductive workload for the salary equity review committees.

The final point to emphasize is that the creation of any review procedure scenario required a trade-off between a policy-determined and statistically-determined significant flagging criterion. The fact that, as a general rule, two standard deviations are used to flag potential data point outliers in a regression model, does not necessarily mean it is an acceptable procedure for flagging individuals for potential salary inequity. In sum, any scenario constructed required some kind of compromise between policy-correct and statistically-correct procedures in determining the flagging criterion.

CHAPTER IV

SUMMARY

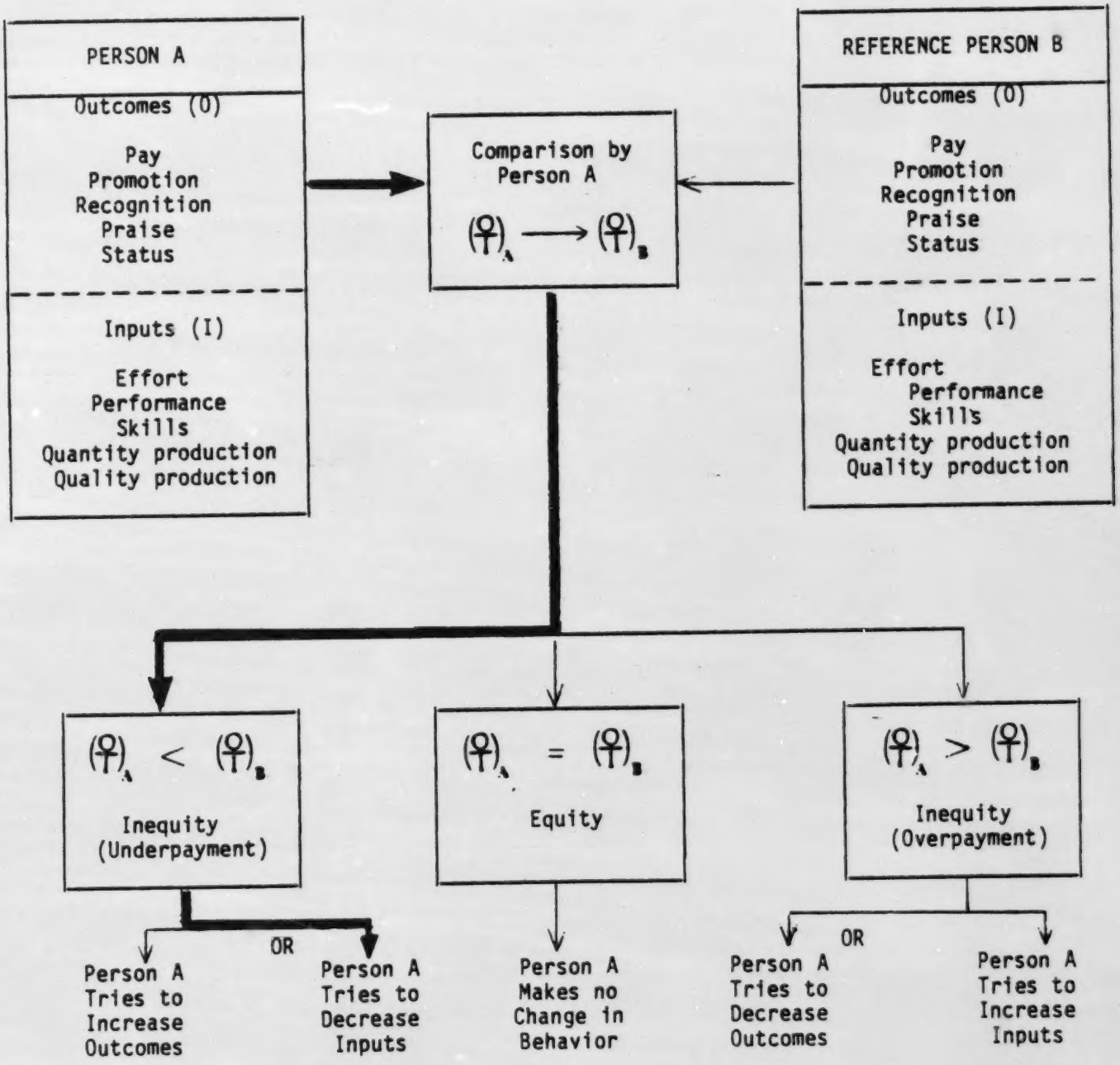
The 1983 University of Alaska Salary Equity Study represents the first time the University has conducted a comprehensive employee salary equity review. Three primary motivations prompted the development of various multiple regression models to help locate potential salary inequities within each EEO job category at this time. First and foremost is the University's committment to eliminate any uncovered salary inequities that have resulted from past employment practices within the University of Alaska statewide system. The second motivation is to reduce the University's liability in the area of salary discrimination based on sex or race factors. Lastly, it is hoped that by the systematic correction of any salary inequities found by such a process, employee morale and, consequently, productivity will increase.

The first two study motivations are, for the most part, self-explanatory and have been elaborated on in the main body of this paper. The third motivation is more abstract but is, in fact, a direct application of the concepts of classical Equity Theory developed by Adams (1961) and reported in Organ and Hamner (1982, pp. 169-171). Figure 4.1 graphically shows employee responses to perceived inequity under classical Equity Theory. The highlighted flow represents the employee response path which the salary equity study process hopes to minimize. To minimize the highlighted flow in Figure 4.1, inequities must first be found. To avoid a resultant decrease in employee inputs into the organization, (which include effort, performance, skills, and quantity and quality of production), the outcomes provided by the organization must increase (which include pay, promotion, recognition, praise and status). Further elaboration of this and more subtle reactions to perceived inequitable treatment can be found in Hickson, 1961, Pritchard, 1972, or Glueck, 1978.

The attainment of each of the goals that functioned as motivations for the salary study is, of course, dependent upon how the results of the analytical process described in this paper are implemented. Multiple scenarios were constructed to test alternative implementation plans and also to gauge the

FIGURE 4.1

Employee Responses to Perceived Inequity
Under Classical Equity Theory



likely impact of each implementation plan to the University. The degree to which each of these alternative scenarios impact the University is a function of not only the degree that real salary inequities exist within the population of employees that were identified for review, but also the policy-related scenario constraints themselves.

Caveats

The salary equity models developed for the University of Alaska employees did not include every employee of the University of Alaska. The sample size of 2,403 employees excluded part-time employees, temporary employees, bargaining unit members and those employees which would have otherwise been in the study, but failed various screening criteria.

The use of salary ranges for the classified employees for grouping employees by job requirement, skill or responsibility level, were poor equivalents to the Hay Point scale that exists for executive and professional employees. Until a more adequate job rating scale is developed, the use of salary ranges will have to suffice.

A group of executive administrators in EEO category 1 had to be deleted from the study because no Hay points had been assigned to those positions. Others in EEO category 1 and also in EEO category 3 (professional), had to be transferred to EEO category 2 (faculty, faculty-admin.) even though their responsiblities are administrative in nature.

Regarding both ranges and Hay points, there may exist built-in errors or built-in bias if an employee has a position that has been assigned a low Hay point total in relation to the actual responsibilities and requirements of the job. What may be a true inequity could be missed by the regression models.

Very little exists in the literature in the area of follow-up analyses once salary equity models have been constructed. Studies that report an assessment on how well multiple regression models that have been implemented located individuals truly experiencing salary inequities and how well the model predicted salaries correlated with the actual salary adjustments made to the salaries of these individuals, were difficult to locate. The most similar study to the University of Alaska's approach found was the University of Illinois study previously mentioned. In that study, a multiple regression model was used which flagged 60 female faculty members for salary equity committee review. The committee awarded adjustments to 32 of the women, or roughly half. Additionally, the correlation between the regression-analysis-based adjustments and peer recommendations was only 0.04, which is not significantly different from zero (Braskamp, Langston, and Muffo, 1978, p. 4). In other words, the adjustments that were recommended by their salary equity committee did not correspond to the predicted salary adjustments derived by their regression model.

It should be understood that the multiple regression models developed only predict a portion of the variation between salaries of University of Alaska employees. It is not possible to include all relevant factors that contribute to why a particular individual earns the salary he or she does. For example, no merit or performance dimension can be included in the models at this time. In light of this, it is apparent that something more than a strict formula approach should be used for definitively stating which flagged employees are currently experiencing salary inequities and by what degree.

It should also be mentioned that the data file that was finally used was not perfect. Consequently, some individuals will be flagged for inequity review partially because of data problems. The correct data should be used and re-input into the proper regression model to determine whether or not the flagged individual remains flagged.

Future Research

The study raised many issues for future studies, of which the following five were deemed most important:

1) Efforts should be made to incorporate productivity or quality of performance factors.

2) In the models developed, supply and demand factors were aggregated to the college level. More work on more sensitive market factor variables should be researched.

3) A job rating scale, similar to the Hay point scale, should be developed for classified employees in EEO categories 4 through 7 and incorporated into the models.

4) Constant feedback to monitor salary inequities should occur. Evaluation of the success of the models used in this study should form the basis for an improved analysis in the future.

5) Various multivariate approaches could be tried to locate non-salary related discrimination, especially with respect to the faculty employee group.

APPENDIX

STATISTICAL SUMMARIES

TABLE B.1

Overview of Statistical Summaries

EEO CATEGORY	1	2	3	4	5	6	7
	Executive Category	Faculty Faculty-Admin. Category	Professional Category	Secretarial Category	Technical Category	Skilled Category	Service Category
QUESTION 1. Do statistically significant salary differences exist between sexes and races for each EEO category?	YES	YES	YES	YES	NO	YES	YES
QUESTION 2. Could any of the statistically significant differences found be partially due to sex or race factors?	YES	YES	YES	Inconclusive	N/A	Inconclusive	Inconclusive
QUESTION 3. Which individuals should be considered for salary equity committee review?							
	R^2 = .83	R^2 = .88	R^2 = .79	R^2 = .87	R^2 = .95	R^2 = .88	R^2 = .92
	Hay Points UA Exper Yrs Doctorate	Rank Present UA Position Yrs Admin. Degree Year Teaching Discipline Related UA Exper Yrs Doctorate	Hay Points UA Exper Related Exper Yrs Degree or Not	UA Exper Yrs Ranges	Present UA Position Yrs Ranges Related UA Exper Yrs	UA Exper Yrs Ranges	UA Exper Yrs Ranges Related Exper Yrs

TABLE B.2

Summary Statistics for EEO-1 - Executive

QUESTION 1. **Do statistically significant salary differences exist between sexes and races?**

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	75	52,300	F Ratio = 3.906,
Group 2 - Minority Male	15	50,400	significant at
Group 3 - White Female	42	46,000	0.05 level.
Group 4 - Minority Female	2	43,100	

Step 2 - Fisher's LSD Test

		GROUP			
G		1	2	3	4
R	1			Yes	
O	2				
U	3				
P	4				

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found not to be significant at the 0.05 level.

QUESTION 2. **Could any of the statistically significant differences found be due partially to sex or race factors?**

Result Four variables loaded. The sex dummy variable loaded third with a positive coefficient. R squared is 0.80. Answer is Yes.

QUESTION 3. **Using a white male multiple regression model, which individuals should be considered for salary equity review?**

Result R Squared = 0.83
Standard Error = 4,364
Predicted Salary = 19,897
+ 34 * (Total Hay Points)
+ 947 * (Years of UA Experience)
+ 2,157 * (If Doctorate Earned)

TABLE B.3

Summary Statistics for EEO-2 -
Faculty, Faculty - Admin.

QUESTION 1. Do statistically significant salary differences exist between sexes and races?

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	461	55,100	F Ratio = 18.884,
Group 2 - Minority Male	42	53,200	significant at 0.01
Group 3 - White Female	144	47,300	level.
Group 4 - Minority Female	8	41,500	

Step 2 - Fisher's LSD Test

		GROUP			
G		1	2	3	4
R	1			Yes	Yes
O	2			Yes	Yes
U	3				
P	4				

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found not to be significant at the 0.05 level.

QUESTION 2. Could any of the statistically significant differences found be due partially to sex or race factors?

Result Thirteen variables loaded. The sex/race interaction dummy variable loaded thirteenth with a positive coefficient. R squared is 0.89. Answer is Yes.

QUESTION 3. Using a white male multiple regression model, which individuals should be considered for salary equity review?

Result R Squared = 0.88
Standard Error = 4,137
Predicted Salary = 45,143
+ 23,999 * (If Rank Full Professor)
+ 14,387 * (If Rank Associate Professor)
+ 659 * (Present Position Years at UA)
+ 5,629 * (If Administrative)
- 1.8 * (Year of Degree Squared)
+ 2,484 * (If Teaching Discipline Business)
+ 452 * (Related Experience Years at UA)
+ 5,317 * (If Rank Assistant Professor)
+ 1,208 * (If Doctorate Earned)
+ 2,564 * (If Teaching Discipline SMI)

TABLE B.4

Summary Statistics for EEO-3 - Professional

QUESTION 1. **Do statistically significant salary differences exist between sexes and races?**

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	163	39,400	F Ratio = 3.749,
Group 2 - Minority Male	11	41,800	significant at 0.05
Group 3 - White Female	100	36,700	level.
Group 4 - Minority Female	15	37,600	

Step 2 - Fisher's LSD Test

		GROUP			
G		1	2	3	4
R	1			Yes	
O	2			Yes	
U	3				
P	4				

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found not to be significant at the 0.05 level.

QUESTION 2. **Could any of the statistically significant differences found be due partially to sex or race factors?**

Result Six variables loaded. The race dummy variable loaded fifth with a negative coefficient. R squared is 0.79. Answer is Yes.

QUESTION 3. **Using a white male multiple regression model, which individuals should be considered for salary equity review?**

Result R Squared = 0.79
Standard Error = 3,416
Predicted Salary = 16,827
+ 37 * (Total Hay Points)
+ 650 * (Years of UA Experience)
+ 108 * (Years of Related Experience)
- 1,690 * (If No Degree Earned)

TABLE B.5

Summary Statistics for EEO-4 - Secretarial

QUESTION 1. **Do statistically significant salary differences exist between sexes and races?**

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	58	22,200	F Ratio = 11.367,
Group 2 - Minority Male	16	22,000	significant at
Group 3 - White Female	525	23,700	0.01 level.
Group 4 - Minority Female	138	21,900	

Step 2 - Fisher's LSD Test

		GROUP 1	2	3	4
G					
R	1			Yes	
O	2				
U	3				
P	4			Yes	

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found to be significant at the 0.05 level.

QUESTION 2. **Could any of the statistically significant differences found be due partially to sex or race factors?**

Result Nine variables loaded. None of the race or sex dummy variables loaded. R squared is 0.88. Answer is inconclusive.

QUESTION 3. **Using a white female multiple regression model, which individuals should be considered for salary equity review?**

Result R Squared = 0.87
Standard Error = 3,416
Predicted Salary = 14,715
+ 539 * (Years of UA Experience)
+ 10,686 * (If in Range 75)
+ 7,804 * (If in Range 74)
+ 17,588 * (If in Range 77)
+ 16,524 * (If in Range 78)
+ 5,710 * (If in Range 73)
+ 13,269 * (If in Range 76)
+ 4,217 * (If in Range 72)
+ 2,272 * (If in Range 71)

TABLE B.6

Summary Statistics for EEO-5 - Technical

QUESTION 1. **Do statistically significant salary differences exist between sexes and races?**

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	128	28,400	F Ratio = 1.787,
Group 2 - Minority Male	10	27,400	not significant
Group 3 - White Female	131	27,200	at 0.10 level.
Group 4 - Minority Female	14	25,300	

Step 2 - Fisher's LSD Test

		GROUP			
G		1	2	3	4
R	1				
O	2				
U	3				
P	4	Yes			

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found to be significant at the 0.05 level.

QUESTION 2. **Could any of the statistically significant differences found be due partially to sex or race factors?**

Result Ten variables loaded. The sex dummy variable loaded ninth with a negative coefficient. R squared is 0.91. Answer is Not Applicable.

QUESTION 3. **Using a white male multiple regression model, which individuals should be considered for salary equity review?**

Result R Squared = 0.95
Standard Error = 1,381
Predicted Salary = 18,734
+ 688 * (Present Position Years at UA)
+ 13,548 * (If in Range 77)
+ 9,424 * (If in Range 76)
+ 15,219 * (If in Range 78)
+ 7,357 * (If in Range 75)
+ 3,793 * (If in Range 74)
+ 163 * (Related Experience Years at UA)
+ 1,685 * (If in Range 73)

TABLE B.7

Summary Statistics for EEO-6 - Skilled

QUESTION 1. **Do statistically significant salary differences exist between sexes and races?**

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	92	35,400	F Ratio = 4.139,
Group 2 - Minority Male	8	32,800	significant at
Group 3 - White Female	4	27,000	0.05 level.
Group 4 - Minority Female	0	0	

Step 2 - Fisher's LSD Test

		GROUP 1	2	3	4
G					
R	1				
O	2				
U	3	Yes			
P	4				

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found not to be significant at the 0.05 level.

QUESTION 2. **Could any of the statistically significant differences found be due partially to sex or race factors?**

Result Six variables loaded. None of the race or sex dummy variables loaded. R squared is 0.89. Answer is Inconclusive.

QUESTION 3. **Using a white male multiple regression model, which individuals should be considered for salary equity review?**

Result R Squared = 0.88
Standard Error = 2,124
Predicted Salary = 25,977
+ 616 * (Years of UA Experience)
+ 10,236 * (If in Range 78)
+ 5,753 * (If in Range 77)
- 9,851 * (If in Range 71)
+ 2,180 * (If in Range 76)

TABLE B.8

Summary Statistics for EEO-7 - Service

QUESTION 1. Do statistically significant salary differences exist between sexes and races?

Step 1 - One-way ANOVA Test

	N	Mean Salary	
Group 1 - White Male	85	25,600	F ratio = 6.079,
Group 2 - Minority Male	45	23,000	significant at
Group 3 - White Female	29	23,100	0.01 level.
Group 4 - Minority Female	42	23,100	

Step 2 - Fisher's LSD Test

		GROUP			
G		1	2	3	4
R	1		Yes	Yes	Yes
O	2				
U	3				
P	4				

Yes denotes a significant salary difference exists for pairs of groups at the 0.05 level.

Step 3 - Bartlett - Box F Test

This test of the assumption of equal variances was found to be significant at the 0.05 level.

QUESTION 2. Could any of the statistically significant differences found be due partially to sex or race factors?

Result Nine variables loaded. None of the race or sex dummy variables loaded. R squared is 0.93. Answer is Inconclusive.

QUESTION 3. Using a white male multiple regression model, which individuals should be considered for salary equity review?

Result R Squared = 0.92
Standard Error = 1,339
Predicted Salary = 25,938
+ 592 * (Years of UA Experience)
- 5,246 * (If in Range 73)
- 3,797 * (If in Range 74)
- 6,562 * (If in Range 72)
+ 3,916 * (If in Range 77)
+ 4.8 * (Related Other Experience Years Squared)

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